

methods employed in measuring the distribution and amount of their magnetism. Then come three long chapters recounting very minutely the details of the dimensions, weight, strength, &c., of no less than forty-six individual magnets, together with particulars of the successive magnetisations imparted to them. The work concludes with a discussion of results and of the formulæ for empirically representing them, and with a brief obituary notice of the author, by Dr. Figee.

It appears from the observations of the constructor, van Wetteren, that bars of steel of apparently equally good qualities in other respects will not make equally good magnets; a point which the author tells us he was unwilling to recognise until he found all the magnets fabricated from one bar inferior to *all* the magnets fabricated from a bar of what appeared to be equally good steel. English bar steel was found inferior by comparison with that manufactured on purpose by M. Wetteren, but the author confesses his inability to assign any reason for the inferiority. Concerning the details of forging and tempering a judicious silence is maintained. The method of magnetisation which was found most efficacious both for bar and horse-shoe magnets, was to place their extremities upon the poles of a powerful electro-magnet of the form constructed by Ruhmkorff for diamagnetic experiments; and then, while thus magnetised above saturation, to remove them after having applied the appropriate keeper. For magnets weighing so much as half a kilogramme an Elias ring was also applied as an auxiliary in the process of magnetisation. The maximum power was not developed until after two or three such magnetisations, the keeper being momentarily removed between each repetition. Reversal of the poles always produced consequent points. The methods of touch, the best of which the author considered to be Høffer's method of stroking the horse-shoe magnet with a second horse-shoe of soft iron from the poles toward the equator of the magnet, he finally rejects, *in toto*, as being hurtful to the strength and regularity of distribution of the magnetism.

The most important part of the memoir is that devoted to a discussion of the portative force of magnets. Häcker has given the ratio between the portative force of a horse-shoe magnet and that of a bar-magnet of the same weight and length as two to one. M. van Willigen found the ratio with an actual magnet of Häcker to be as three to one; and with van Wetteren's magnets more than four to one. The empirical formula assigned by Bernoulli to express the relation between the weight of a magnet and its portative force is—

$$p = CR^{\frac{2}{3}},$$

where p is the weight which the magnet will sustain, R its own weight, and C a coefficient dependent on the quality of steel and other undetermined conditions. A magnet was adjudged good by the author's standard for which Bernoulli's coefficient had a value of 20 or 21; though 22.5 was occasionally attained. The empirical formula now assigned by van Willigen for the portative force of supersaturated magnetisation is—

$$P = aK\sqrt{S} \cdot \sqrt[4]{\frac{L}{\sqrt{S}}};$$

and for the permanent portative force—

$$p = \beta K\sqrt{S} \cdot \sqrt[4]{\frac{L}{\sqrt{S}}} \cdot \frac{L}{l},$$

where K is the perimeter and S the area of the polar surfaces, l the length of the bar, L the reduced length (or distance between the actual poles or points of maximum free magnetism), and a and β two coefficients depending on temperature, quality of steel, temper, &c. It will be seen that since for magnets of similar form the quantity $K\sqrt{S}$ is proportional to the $R^{\frac{2}{3}}$ of Bernoulli's formula, M. van Willigen has determined that factor of the coefficient which is concerned with the length of the magnet and the position of its poles. It would be interesting, though out of place here, to compare these results with those recently obtained by M. Petrowchewsky in his researches on the distribution of magnetism in magnets.

The author falls into the common error of ascribing to M. Jamin the invention of magnets made of laminae of steel bound together in bundles. Magnets of this description were employed by Dr. Scoresby in his Arctic explorations at the beginning of the century, and may still be seen in the Whitby Museum, where they are deposited. Similar magnets were in even earlier use by Duhamel and Coulomb; and a magnet almost the counterpart of those of Jamin is described in a memoir on magnets by Geuns published at Venlo, in Holland, in 1768.

SILVANUS P. THOMPSON

OUR BOOK SHELF

Mittheilungen aus dem k. zoologischen Museum zu Dresden, herausgegeben mit Unterstützung der königlichen Sammlungen für Kunst und Wissenschaft. Von Dr. A. B. Meyer. Drittes Heft, mit Tafel XXVI.-XXXV. (Dresden: Baensch, 1878.)

DR. MEYER has now issued the third volume of his "contributions" to science from the well-filled stores of the Dresden Museum—a volume which quite equals its precursors in value and interest. The Director first gives us an account of his new cases for the exhibition of zoological objects, and supplies exact details as to their cost. These particulars may be useful for those engaged on the fittings of several other national museums which are now in process of erection. A contribution from M. Edm. de Selys-Longchamps, which follows, contains a general account of the dragon-flies of New Guinea and the Moluccas, and descriptions of a large number of new species of these insects. We have next an account of the human skeletons and skulls in the Dresden Museum, drawn up by the Director and Herr E. Tügel jointly. The number of skulls in the collection is stated to be 836. We have then an important article by our countryman, Mr. R. Bowdler Sharpe, on the collections of birds belonging to certain groups, made by Dr. Meyer during his expedition to New Guinea and the Moluccas. The groups treated of in this paper are the Accipitres, Dicruridæ, and Campophagidæ, of all of which divisions Dr. Meyer obtained a goodly series of specimens, embracing among the Campophagidæ examples of nine new species.

Dr. Kirsch, the Entomologist of the Dresden Museum, follows Mr. Sharpe with descriptions of some new wasps found in the collection, and the volume is concluded by a second portion of Dr. Meyer's memoir on the Papuan skulls of which he obtained such a splendid series during his Eastern Expedition.

It is quite evident that the present director of the Dresden Museum is not only capable of doing good work

himself, but is likewise able to extract good work out of other people—a task often more hard to be accomplished than the former one.

The Countries of the World. By Robert Brown, M.A., Ph.D. Vol. iii. (London: Cassell.)

THIS volume is devoted to Central and South America, and appears to us to present a fairly full and trustworthy and certainly interesting account of the countries of this most attractive region. Dr. Brown has evidently taken the trouble to search most of the authorities likely to help him. The illustrations to this volume are unusually good and appropriate.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

A Carnivorous Goose

I INCLOSE to you an account of a Golden Eagle, which I have reason to know to be authentic. The possibility of a bird so purely graminivorous as a goose being taught to eat flesh, and acquiring the power of digesting it, is extremely curious. It is well known, however, that cows are largely fed on fish offal in Scandinavia, and I have heard of a Highland cow devouring a salmon which an unwary angler had hid among fern on the banks of a river in Sutherland.

Isola Bella, Cannes, April 7

ARGYLL

"March, 1879.—There is in the possession of W. Pike, Esq., at Glendarary, in the Island of Achil, Co. Mayo, a Golden Eagle, now about twenty-five years old, which was taken from the nest and brought up in confinement. This eagle, in the spring of 1877 laid three eggs, which Mr. Pike took away, replacing them with two goose-eggs, upon which the eagle sat, and in due time hatched two goslings. One of these died, and was torn up by the eagle to feed the survivor, who, to the great tribulation of its foster-parent, refused to touch it, together with the other flesh with which the eagle tried to feed it, Mr. Pike providing it with proper food. The eagle, however, in course of time, taught the goose to eat flesh, and (the goose having free exit and ingress to the eagle's cage) always calls it by a sharp bark whenever flesh is given to it, when the goose hastens to the cage and greedily swallows all the flesh, &c., which the eagle, tearing its prey to pieces, gives it.

"I saw them in May, 1878, when, the goose being a year old, had made a nest in the eagle's cage, and laid eleven eggs, and the two birds were sitting side by side on the nest. I hear from Mr. Pike that he did not allow them to hatch out, fearing that it might interfere with their attachment to one another.

"The eagle is very tame and fond of Mr. Pike; he goes into the cage, and it allows him to handle it as he likes, but will not allow any one else near it. It never attempts to get out of the hole made for the goose to go in and out."

Sense of Force and Sense of Temperature

THE sense of force, or of resistance to pressure, and the sense of temperature, have been very commonly confounded under one name, "sense of touch." Indeed, I think they are still imperfectly distinguished in many modern works dealing with the subject of sensation. Nevertheless, there can be no doubt as to these two being sensations altogether distinct. It is even quite probable that they are observed and transmitted by distinct nerve-systems.

As an important and interesting question arises as to the kind of information given to us by these two senses; viz., how far it is merely relative, and how far these senses may, by cultivation, be made to give us absolute information.

So far as the sense of force is concerned, it is with most persons chiefly relative. Every one is prepared to say, but generally very roughly, that of two bodies, A and B, A is heavier

than B. To test their relative weights we lift first the one and then the other, and decide between them. Sometimes we may go a little farther towards making an absolute estimate by means of the sense of force. I can tell, for example, that a weight is greater than 20 lbs. and less than 30 lbs. by trying to hold it out at arm's length; and most likely with a little practice I could learn to estimate weights to within closer limits than 5 lbs. on each side of 25 lbs. But such testing as this is all that is done in ordinary cases.

There is, however, a very remarkable case in which the sense of force is made absolute to a high degree by practice. It is the case of letter-sorters in the Post Office, who learn to distinguish letters that are over a particular weight with accuracy that is perfectly marvellous. It would be very interesting to try a series of experiments with letters of different weight, some slightly under weight for a particular postage, and some slightly overweighted, and to observe the errors or rather the limits of uncertainty.

The sense of temperature may also be rendered absolute to a certain extent. Several instances might be mentioned, some of which depend, as in the case of testing force by lifting the greatest possible weight in a particular way, on the limit of endurance.

One remarkable case of an absolute determination of temperature by the senses is that of the plumber and tinsmith who are in the habit of holding up the soldering bolt to the face, and judging by feeling whether it is at the proper temperature for a particular piece of work in hand.

Probably there are other cases in the arts in which the sense of temperature is cultivated to a high degree. It is in the hope of getting information on this subject through your readers that I address this note to you.

J. T. B.

April 7

Did Flowers Exist During the Carboniferous Epoch?

MR. A. R. WALLACE, in his review of Mr. Allen's, "The Colour Sense" (NATURE, vol. xix. p. 501), has been misled in supposing the fossil insect from the Belgian coal-fields, named *Breyeria borinensis* may be a moth. It was originally described as the hind wing of an orthopterous insect, under the name of *Pachytolopsis borinensis* (Comptes Rendus, Soc. Ent. Belg. xviii. p. xli). Subsequently it was transferred to the lepidoptera on bad advice, and re-named *Breyeria borinensis* (same Comptes Rendus, p. lx.). Its original location was nearer the truth. I examined the fossil at Brussels in 1877, and have no doubt it belongs to the pseudo-neuroptera, family Ephemeridae (vide my note to this effect in the same Comptes Rendus for 1877, xx. p. xxxvi.). The very dense transverse reticulation did not receive sufficient importance when M. de Borre was induced to refer it to the lepidoptera. Thus we remain without any zoological evidence that would tend to prove the existence of flowering plants in the carboniferous age.

R. MCLACHLAN

Lewisham, April 4

Water-level Indicators

I OBSERVE in NATURE (vol. xix. p. 518) a description of what is stated to be a new form of water-level indicator which has lately been erected by the India-rubber, Gutta-percha, and Telegraph Works Company, at the Leamington New Waterworks.

So far as mere form goes, it possibly may be considered new, but hardly so in any other sense, as a water-level indicator, fulfilling the purposes you mention, on a very extended scale, has been in action at the Nottingham Waterworks for many months past. It is not only capable of being made to give smaller indications than one foot, but is actually doing so. This apparatus was designed and constructed in the electrical department of the General Post Office, and has given great satisfaction. I may mention that it was under the consideration of Mr. Preece so far back as the latter end of 1877, and but for his determination to have an instrument perfect in every respect before he turned it out, it might have been at work early in 1878.

Nottingham, April 8

H. ROFE

Eastern Yucatan

Is there any information to be had about Eastern Yucatan? In 1847 the Maya Indians there rose against Mexico and have become independent. The animosity between them and the Mexicans is so great that there is scarcely any possibility of